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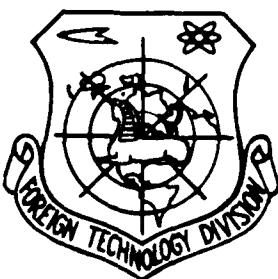
FOREIGN TECHNOLOGY DIVISION



DICTIONARY OF MISSILE AND ARTILLERY TERMS
(Selected Pages)

by

A.P. Bogatskiy, F.S. Kuznetsov



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HUMAN TRANSLATION

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DICTIONARY OF MISSILE AND ARTILLERY TERMS
(Selected Pages)

By: A.P. Bogatskiy, F.S. Kuznetsov

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

*ye initially, after vowels, and after t, t; e elsewhere. When written as ë in Russian, transliterate as ye or ë.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	\sinh^{-1}
cos	cos	ch	cosh	arc ch	\cosh^{-1}
tg	tan	th	tanh	arc th	\tanh^{-1}
ctg	cot	cth	coth	arc cth	\coth^{-1}
sec	sec	sch	sech	arc sch	\sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
лг	log

GRAPHICS DISCLAIMER

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DICTIONARY OF MISSILE AND ARTILLERY TERMS

(Excerpt: *astroinertsial'naya sistema* [astroinertial system] to *vysota razryva* [burst altitude])

ASTROINERTIAL SYSTEM [*astroinertsial'naya sistema*] - See *Inertsial'naya sistema upravleniya raketoy*.

ASTRONAVIGATION [*astronavigation*] - System of navigation in which the location of a moving object is determined by measuring the altitude of celestial bodies.

ASTRONAVIGATIONAL SYSTEM [*astronavigatsionnaya sistema*] - Autonomous guidance system in which the position of a missile in space is determined by astronomical instruments (telescopes aimed at preselected celestial bodies) in conjunction with gyrosystem. Astronavigational systems can provide highly accurate guidance and do not depend on range. Used for extended controlled flights of long-range ballistic missiles, cruise missiles etc.).

ASTRONAUTICS [*astronavtika*] (from the Greek *astro* ("star") and the Greek *nautike* ("navigation")), cosmonautics (astronavigation) - Science of flying vehicles in space.

ASTRONOMICAL COORDINATES [*astronomicheskiye koordinaty*] - Geographical coordinates (longitude and latitude) established with reference to celestial bodies.

STAR TRACKER, astrotracker [*astroorientator*] - Automatic onboard astronomical instrument which continuously determines the geographical coordinates of the position of a moving object (aircraft, missile, ship) with reference to celestial bodies.

ASTRORADIO COMPASS [*astroradiokompas*] - Radio compass, the principle of operation of which is based upon the detection of radio emissions from the Sun.

ASTRORADIO NAVIGATION [*astroradiionavigatsiya*] - System of radio navigation whereby radio beams emitted by celestial bodies (Sun, Moon etc.) are used to take bearings on them.

ATMOSPHERE [*atmosfera*] - 1. Technical unit of pressure measurement equal to 1 kg/cm².
2. The envelope of air surrounding the Earth.

NUCLEAR ARTILLERY [*atomnaya artilleriya*] - Artillery designed to fire projectiles with a nuclear charge.

NUCLEAR ROCKET [*atomnaya raketa*] (ROCKET WITH NUCLEAR ENGINE) [*raketa s atomnym dvigatelem*] - Rocket, motion (thrust) of which is generated by a nuclear rocket engine. The essential difference between conventional and nuclear rockets consists in the method employed to generate the power required to move the rocket. With the exception of the section containing the nuclear rocket engine, the configuration of the nuclear rocket resembles that of conventional rockets. The nuclear rocket is a multistage rocket. The first stage of the nuclear rocket operates on conventional solid or liquid fuel. At the point of engine shutdown, the nuclear rocket has reached a terminal velocity exceeding by many times the terminal velocity of a conventional rocket. The nuclear rocket operates on fissionable nuclear material.

NUCLEAR WEAPON [*atomnaya oruzhiye*] - Weapon which achieves its effect with the use of nuclear energy. Explosive nuclear weapons are based upon the exploitation of the nuclear energy instantaneously released by an explosive reaction. They are designed to destroy a variety of targets (structures, materiel, personnel). Nuclear weapons achieve their effect through the action of the following destructive factors: *shock wave*, *luminous radiation* and *penetrating radiation*. The category of explosive nuclear weapons would include nuclear bombs, large-caliber artillery projectiles, missiles, torpedoes and cruise missiles.

NUCLEAR (ROCKET-ENGINE) FUEL [*atomnoye toplivo (reaktivnykh dvigatelyey)*] - Futuristic fuel consisting of fissile material (nuclear fuel) with high concentrated energy content and differing fundamentally from any other type of fuel used hitherto. The fission of 1 kg of uranium-235 is equivalent to the combustion of 2200 t of gasoline. Just 10% of the energy released thereby would be sufficient to fire a 100-ton projectile 20,000 km.

ATOMIC ARTILLERY PROJECTILE [*atomnyy artilleriyskiy snaryad*] - Artillery projectile fitted with a nuclear charge designed to be fired from an atomic gun. The projectile is fired from the gun by a conventional powder charge. The enormous destructive power of atomic projectiles would be the equivalent of that of 1000-15,000 tons of TNT. The shell fired from the American 280-mm atomic gun, for example, is 90 cm long, weighs 450 kg and has the destructive power of 15,000 tons of TNT. Atomic artillery projectiles have the external appearance of the conventional rifled tube artillery projectiles.

NUCLEAR WARHEAD [*atomnyy boyevoy zaryad*] - Consists of a charge of fissile material (uranium-235 or plutonium-239), a charge of conventional explosive (TNT), neutron reflector, jacket and detonators.

NUCLEAR EXPLOSION [*atomnyy vzryv*] - Explosion of a nuclear charge. Observed as a blindingly brilliant flash which illuminates the sky and the ground for hundreds of kilome-

ters and is accompanied by a burst of intense sound resembling a lightning discharge. The flash is followed immediately (simultaneously with an air burst) by a fireball which remains visible for several seconds over a great distance. The fireball rises rapidly, entraining as it does large volumes of air, dust and smoke, and then, as it cools, gradually develops into a swirling gray mushroom-shaped cloud. Nuclear explosions are accompanied by a powerful shock wave, both luminous and penetrating radiation and radioactive contamination of ground and air.

NUCLEAR REACTOR [*atomnyy reaktor, atomnyy kotel*] - Structure designed to contain the controlled chain reaction involved in the splitting of the nuclei of heavy elements. Nuclear reactors are provided with exceptionally heavy shielding. They are surrounded by concrete many meters thick. This confines the lethal gamma rays.

NUCLEAR STRIKE [*atomnyy udar*] - Attack against a hostile target with a nuclear weapon.

ACHROMATIC LENS, achromat [*akhromat*] - Lens which removes spherical and chromatic aberrations. Used in binoculars, panoramic and stereoscopic telescopes, range finders, viewfinders, periscopes, optical sights and geodetic and other optical instruments.

ACHROMATISM [*akhromatizm*] - Quality of a system of optical glasses (total internal reflection prisms) enabling it to refract light without decomposing it into its constituent colors.

ACHROMATIC [*akhromaticheskiy*] - 1. colorless, not decomposing beams of light into constituent colors. 2. Lens removing spherical and chromatic aberrations.

AERODYNAMICS [*aerodinamika*] - Science dealing with laws governing the motion of air and other gases and with the effects they exert on bodies around which they flow; in other words, the science of resistance to the motion of bodies in air and other gases. Specifically, aerodynamics focuses on the effect of air on aerodynes (aircraft, rockets, missiles). A specialization within the field of aerodynamics studying the motion of compressible gases is referred to as gas dynamics. With the advent of high-speed aircraft, gas dynamics has found extensive application in aviation and jet technology and constituted the basis of a new field of knowledge - high-speed aerodynamics.

WIND TUNNEL [*aerodinamicheskaya truba*] - Laboratory apparatus designed to generate flows of air in support of the experimental study of phenomena associated with the motion of air around bodies. Because of the complex nature of the motion of particles of air travelling around solid objects, it is not possible to solve all practical technical problems purely mathematically (problems involving the magnitude of drag, for example, or the distribution of pressure over the surface of a body). An experimental approach based on the general laws of mechanics and permitting studies to be conducted on scale models under laboratory conditions has therefore found extensive application.

The general principle underlying wind tunnel experiments is the principle of motion reversal, whereby the motion of a body relative to surrounding air is replaced by the motion of air against a stationary body. Wind tunnels can be used to test both models of entire rockets and individual components of them.

Wind tunnel tests of model rockets enable researchers to determine, for example, the following:

- the nature of the lift and moments acting on the model;
- characteristics of the stability and controllability of a rocket;
- maneuverability characteristics;
- rolling moment and the effectiveness of lateral (roll) control surfaces;
- roll damping;
- longitudinal rotation damping;
- load characteristics
- drag or zero lift and induced drag;
- wing-body and wing-tail vibration.

AERODYNAMIC CONTROL SURFACES [*aerodinamicheskiye ruli*] - Control surfaces [vozdushnyye ruli]. See VOZDUSHNYYE RULI.

DRAG [*aerodinamicheskoye soprotivleniye*] - Force generated by the relative motion of body and air (a body in motion relative to surrounding air or air in motion relative to a body). Friction and pressure acting on a body from the direction of a flow yield a certain resultant force, which is referred to as total drag R . In the case of flow around symmetrical bodies with axes of symmetry parallel to the flow, drag will also be parallel to the flow. Under these conditions, R is referred to simply as drag, or as the "frontal resistance" of the body.

In the case of flow around nonsymmetrical bodies, or bodies positioned at an angle to a flow, drag R will be oriented in the direction of the flow. In this case drag R breaks down into a component parallel to the flow and one perpendicular to it. The component parallel to the flow will be the frontal resistance of the body Q , the component perpendicular to the flow the lift R_y .

Drag, or frontal resistance, is the product of two factors: the friction of air on the surface of a body and the difference between the pressures acting on the body fore and aft. Friction on the surface of a body is due to the (intrinsic) viscosity of air. The component of frontal resistance caused by friction is referred to as friction drag. The other component, the result of the difference between pressures, is termed pressure drag.

B

BASE [*baza*] (*B** or *B***) - (Shortest) distance along horizon between two reference points used to establish the position of other points.

TRIM (OF ROCKET) [*balansirovka rakety*] - State in which the moments of all forces relative to the center of mass of a rocket are in equilibrium.

SCALE NUMBER, POINT [*ball*] (in meteorology) - Unit of wind speed measurement equal to roughly 2 m/s.

CATAPULT [*ballista*] - An ancient throwing machine used to hurl stones, logs, barrels of burning tar and other objects to destroy the walls of towns under siege and start fires. The catapult was activated by the force of tightly twisted animal sinews.

BALLISTICS [*ballistika*] - Science studying laws governing the motion of rockets, artillery projectiles, mortar shells and bullets. The science of ballistics breaks down into two fields: internal ballistics and external ballistics. Internal ballistics studies laws governing the motion of projectiles, mortar shells and bullets within the tube of a gun and processes accompanying the firing of a gun. External ballistics is concerned with laws governing the flight of a rocket, projectile, mortar shell or bullet through the air from the point at which they are no longer subject to the effect of the powder gases until they reach the target.

BALLISTITE [*ballistit*] - A smokeless nitroglycerine powder (mixture of pyroxylin and nitroglycerine).

* Cyrillic

** Latin

BALLISTIC PREPARATION OF FIRE [*ballisticheskaya podgotovka strel'by*] - Determining deviations of *ballistic conditions of fire* from the *tables* and factoring these values into preparations for firing.

BALLISTIC MISSILE [*ballisticheskaya raketa*] - Missile with a trajectory consisting of active and passive legs. Along the active leg of its trajectory, the missile is powered by the thrust of a rocket engine and guided by an autonomous or combination guidance system. During the passive portion of its flight, the missile travels, its engine shut down, by inertia along what is referred to as a "ballistic curve" as a body in free fall.

Ballistic missiles may consist of either a single or multiple stages.

BALLISTIC TRAJECTORY [*ballisticheskaya traektoriya*] - The continuous path (ballistic curve) travelled through space by a body in free fall. Ballistic missiles travelling through space follow a ballistic trajectory.

OPERATIONAL BALLISTIC MISSILES [*ballisticheskiye rakety operativnogo naznacheniya*] - Guided ballistic missiles with a range of from a few tens to 1000 km. Employed in support of large military formations.

TACTICAL BALLISTIC MISSILES [*ballisticheskiye rakety takticheskogo naznacheniya*] - Guided ballistic missiles with a range of up to 150 km. Employed directly on the battlefield in support of combined-arms units and formations engaged in combat operations.

BALLISTIC CONDITIONS OF FIRE [*ballisticheskiye usloviya strel'by*] - The following are regarded as normal, or "table," ballistic conditions of fire:

- charge temperature +15°C;
- weight of projectile "normal" per Firing Tables.

Ballistic conditions of fire in fact differ from normal (table) conditions, which causes the mean trajectory of a projectile to deviate from the "table" trajectory. Ballistic corrections are computed to take account of these deviations.

BALLISTIC WIND [*ballisticheskiy veter*] - Estimated (theoretical) wind used for certain atmospheric altitudes producing the same deviation of a missile relative to the table trajectory as actual wind varying with altitude.

BALLISTIC COEFFICIENT (OF A PROJECTILE) [*ballisticheskiy koefitsient snaryada*] - Value characterizing the ability of a projectile to overcome air resistance during its flight. The ballistic coefficient of a projectile is a function of the caliber, weight and shape of the projectile, as well as on the density of the air. The ballistic coefficient is computed in accordance with the following formula:

$$C = \frac{1000id^2}{q} \cdot \frac{H_a}{H_v},$$

where $i = \frac{K \left(\frac{v}{a} \right)^2}{K_{0r}}$ is the shape factor for the projectile, a the caliber of the projectile in meters, q the weight of the projectile in kg, ρ_0 air density at ground level in kg m^{-3} , ρ_{0r} ground level air density regarded as "normal" and equal to 1.206 kg/m^3 , $K \left(\frac{v}{a} \right)$ a function characterizing air resistance as a function of the velocity of the projectile and of the speed of sound and K_{0r} a function characterizing the resistance of air to the motion of the projectile regarded as standard (established experimentally).

WINDSHIELD, BALLISTIC CAP [*ballisticheskiy nakonechnik*] - hollow metal cap (made of steel, Silumin or bronze) screwed onto the blunt tip of a projectile to reduce air resistance.

BALLISTIC AIR TEMPERATURE DEVIATION [*ballisticheskoye otkloneniye temperatury vozdukh*] - Air temperature deviation, constant for a particular projectile (mortar shell, rocket) trajectory altitude, causing the same deviation of a projectile (mortar shell, rocket) in terms of range as actual air temperature distribution within the limits of the trajectory altitude of the projectile (mortar shell, rocket). Air-temperature distribution in terms of altitude is established by vertical atmospheric sounding (temperature sounding).

SWAB [*banit'*] - To clean the tube of a gun after firing, training and movement. Gun tubes are swabbed with fresh soapy water, kerosene etc. Gun tubes may not be swabbed in winter at temperatures below 0° .

BANQUETTE [*banket*] - French word ("step") deriving from the term "bank," i.e., a "bench," or a "seat." Platform with rail stanchions and handrails for gunlayers, gunners and assistant gunners manning heavy-caliber gun positions in land-based coastal and rail-mounted artillery.

BORE BRUSH, cleaning rod [*bannik*] - Artillery tool consisting of a cylindrical brush on a long pole. Used to clean (swab) and lubricate gun and mortar bores and to clear gun bores (rammer). Before the introduction of smokeless powder, a bore would be cleaned with this implement after the firing of every round.

BAR [*bar*] - Unit of atmospheric pressure in meteorology equal to 106 dynes/cm^2 . In practical units, $1 \text{ bar} = 1.019 \text{ kg/cm}^2$; i.e., it coincides with the standard atmosphere and approximates normal atmospheric pressure. For purposes of meteorological observations, atmospheric pressure is measured in millibars; $1 \text{ mbar} = 0.001 \text{ bar} = 0.75 \text{ mm Hg}$.

BARBETTE [*barbet*] - Mound of earth prepared to the rear of a parapet to accommodate a piece of artillery. Barbettes were formerly established in fortified walls and then later in individual emplacements within larger systems of fortifications. 2. On a fighting ship: a) A projecting platform on board ship on which a gun is mounted; b) A protective armored wall behind which is positioned a rotating gun mount. Superseded by turret emplacements.

BAROGRAPH [*barograf*] - Meteorological instrument generating a continuous hard-copy record of atmospheric pressure. Operated by weather observation stations. Depending on the operating principle of the sensor, barographs break down into aneroid and mercury (weight and floating) types. Aneroid barographs are the most commonly used. The sensor consists of several aneroid capsules linked together in series. Variations in atmospheric pressure deform (expand or contract) the capsules, and this motion is transferred by lever to a pen, which then traces a curve on ruled paper tape wrapped onto a drum with a timing mechanism.

BAROMETER [*barometr*] - Meteorological instrument for measuring atmospheric pressure. Depending on the principle of operation involved, barometers can be categorized as follows: mercury, metal and aneroid types plus the barographs, which are recording devices which provide a continuous record of atmospheric pressure. Used for meteorological observations.

BAROMETRIC (BARIC) GRADIENT [*barometricheskiy (baricheskiy) gradient*] - The change in air pressure at sea level (or at any other horizontal level) per unit distance in a direction perpendicular to the isobars. The barometric gradient can be regarded as a vector in the direction of lower pressure, the numerical value of which equals the derivative of pressure along the normal to the isobar. The barometric gradient is measured in millibars. Wind speed is a function of the barometric gradient.

BATTERY SHEAF [*batareynaya veer*] - See *SHEAF* [*veer*].

BATTERY [*batareya*] - Fire and tactical missile or artillery (mortar) subunit*.

FIXED SHORT-RANGE SURPRISE-FIRE BATTERY [*batareya kinzhal'naya*] - Artillery battery emplaced at narrow points along a seaway to furnish surprise fire at very close range on penetrating hostile ships.

FLOATING BATTERY [*batareya plavuchaya*] - Nonpowered vessel mounted with artillery. Floating batteries were deployed during the Civil War and the Great Patriotic War on rivers and at naval bases. Floating antiaircraft artillery batteries were deployed during the defense of Sevastopol' in 1941 to protect the city against air attack from the direction of the open sea.

BUFFETING [*basting*] - The shaking (in-flight oscillation) of the tail assembly of a rocket under the effect of periodic impact air loads generated by eddy flow around forward-lying portions of the body.

SHIPBOARD TURRET MOUNT [*bashennaya korabel'naya ustanova*] - Aggregate of guns with mounts, feed, loading and aiming mechanisms and the armored plating rotating together with the guns and associated mechanisms. The ship gun turret is a complex of highly sophisticated equipment. It comprises fighting and operating compartments, a shell room and a powder magazine. The fighting compartment contains all the guns with their breech mechanisms, feed pieces and aiming-mechanism control points; the operating compartment houses the feed and

* *podrazdeleniye*

aiming mechanisms for the gun; the shell room and powder magazine contain the projectiles and charges respectively. All turret mechanisms are automated. Guns can be loaded quickly. Speed regulators can set aiming times from minimum to maximum. Turret mounts are highly survivable and offer good antiautomatic protection, since operators are surrounded by armor plating. Turret artillery is mounted on battleships and cruisers, deck-turret artillery on destroyers and cruisers (as general-purpose artillery). Turret mounts may have either two or three guns.

TURRET COMMANDER [*bashenny komandir*] - Commander of gun turret.

SHOE (shoe brake) [*bashmak, (bashmachny tormoz)*] - The simplest type of gun running gear brake. The shoe is an iron plate bent at the edge along the sides. It is attached by cable to the carriage and during braking is pressed against one of the wheels to prevent it from rotating. Used on heavy guns not equipped with braking systems on the running gear.

TURRET [*bashnya*] - Armored structure mounted with artillery pieces rotating about its vertical axis designed to protect personnel and equipment against artillery projectiles and bombs. Turrets are more survivable and offer greater protection against nuclear weapons than the conventional open artillery mount.

VOLLEY FIRE [*beglyy ogon'*] - Fire from one or several guns at the maximum possible rate. With the opening of volley fire, each gun will be fired as soon as readied.

NONGYRO CONTROL SYSTEM [*bezgiroskopnaya sistema upravleniya*] - Missile control system in which there are no gyroscopes. These systems use accelerometers to measure deviations of the missile from programmed values.

SMOKELESS POWDER [*bezdyminnye porokha*] - Power used in the fabrication of artillery charges. Two basic types of smokeless powder are used: pyroxylin and nitroglycerine. Pyroxylin smokeless powder is made from a mixture of soluble and insoluble pyroxylin by treating it with a solvent consisting of a mixture of alcohol and ether. There are two basic types of nitroglycerine smokeless powder: ballistite and cordite. Ballistite is a mixture of soluble pyroxylin and nitroglycerine. Cordite is a mixture of insoluble pyroxylin and nitroglycerine. Smokeless powder is available in a wide variety of shapes and sizes. It is manufactured in the form of tapes, tubes and disks. Smokeless powder was invented by the brilliant Russian scientist D. I. Mendeleyev.

RECOILLESS GUN [*bezotkainoye orudiye*] - Gun whose barrel does not recoil when the gun is fired.

RECOILLESS ANTITANK GUN [*bezotkainoye protivotankovoye orudiye*] - Tube open at both muzzle and breech ends. When the gun is fired, the powder gas escapes not only out the muzzle end of the barrel, but to the rear, through the open breech portion of the barrel as well. The breech end is mounted with a nozzle, the effect of which prevents the gun from recoiling. There are multibarrel, self-propelled, smooth-bore and rifled antitank guns, the

latter firing projectiles with a rotating band. According to foreign press reports, recoilless antitank guns are available in 105-, 106-, 120- and 150-mm models. The 106-mm gun is the model employed by the American army. It weighs 220 kg and can penetrate more than 300 mm of armor.

COAST ARTILLERY [*beregovaya artilleriya*] - Type of naval artillery mounted in emplacements along a coast. Intended to operate as a component of a system of coastal defense protecting naval bases, critical stretches of coastline and islands against enemy attack from land and sea. May be either permanently emplaced or mobile (rail-mounted or vehicle-drawn).

COASTAL MISSILE UNITS [*beregovyye raketnyye chasti*] - Naval units* and subunits** whose armament includes fixed or mobile missile launchers. Coastal missile units are intended to operate as components of a system of coastal defense protecting naval bases, critical stretches of coastline and islands against enemy naval attack and to cooperate with ground forces units operating in coastal areas and ships operating at sea.

COMPRESSORLESS JET ENGINE [*beskompressornyy vozdushno-reaktivnyy dvigatel'*] - Type of jet engine in which the fuel mixture is compressed by the velocity head of the incoming air flow. Compressorless jet engines break down into ram-jet and pulse-jet types.

UNMANNED AIR-ATTACK WEAPONS [*bespilotnyye sredstva vozdushnogo napadeniya*] - Autonomously controlled, self-guided or television-controlled aircraft (ballistic and winged missiles, cruise missiles, airplanes etc.) which do not require the on-board presence of a crew or pilot. Unmanned air-attack weapons can be armed with either conventional explosive or nuclear (thermonuclear) charges.

FLASHLESS POWDER [*besplamennyye porokha*] - Conventional pyroxylin powder containing flash-suppressing substances (potassium sulfate, rosin etc.). This type of powder suppresses the flash accompanying discharge, which protects the eyes of the gun crew and limits visibility to 2-5 km (depending on the caliber of the gun). Flashless pyroxylin powder contains approximately 50% flash suppressant (potassium sulfate). Combustion of this type of powder generates large quantities of solid residue, which scatters as smoke.

TUBELESS ARTILLERY [*bessvol'naya artilleriya*] - Type of rocket artillery (launchers) which does not use barrels. Projectiles (mortar shells) are given direction by special launching rails. Tubeless artillery includes rocket artillery vehicles and launchers and antitank guided missile launchers.

BETA RAY (β ray) [*beta-luchi (β -luchi)*] - Electron (or positron) flux associated with decay of the nuclei of atoms of β -radioactive isotopes. Beta rays consist of charged particles (β particles) and therefore deviate from a straight-line path under the effect of electric and magnetic fields. From the magnitude of this deviation it becomes possible to judge the velocity of the particles and the relationship of the charge to the mass of the

* *chasti*

** *podrazdeleniya*

particles forming beams of beta rays. The electrons in a beta ray travel at different velocities. Velocities exceeding 0.998 of the speed of light have been observed in experiments.

BETA DECAY [*beta-raspad*] - Type of radioactive decay in which the atomic nucleus emits electrons β^- or positrons β^+ . As a result of beta decay, an atom of a particular element with a specific atomic weight and nuclear charge will be transformed into an atom of a different element with almost the same atomic weight, but with a nuclear charge which is different by a unit.

CONCRETE-PIERCING PROJECTILE [*betonoboynyy snaryad*] - Artillery projectile with massive (thick) body and nose designed to destroy permanent defensive structures made of concrete (including reinforced concrete).

Concrete-piercing projectiles will be 122-mm in diameter and larger. This type of projectile has a base-type fuze; i.e., the fuze is threaded into the base of the projectile. To apply maximum destructive force to the concrete, the fuze will normally be set for delayed action.

Concrete-piercing shells can penetrate reinforced concrete to considerable depths: the 152-mm shells can penetrate up to 0.75 m of concrete, the 203-mm projectiles up to 1.25 m.

In direct fire, concrete-piercing projectiles can also destroy armored targets.

BINOCULARS [*binokl'*] - Optical instrument consisting essentially of two parallel telescopes attached to one another. Used to observe remote objects and, when provided with a reticle pattern (artillery binoculars), to measure horizontal and vertical angles and determine range. Artillery binoculars provide magnification of 6 \times to 18 \times .

BLANK MAP [*blankovaya karta*] - Topographical map or nautical chart printed in one or several pale colors. Used by staff personnel in the preparation of graphics documentation.

LENS HOOD [*blenda*] - Shade for excluding side light from camera lens.

"BLIZNYATA" ["*bliznyata*"] ('Twins') - Eighteenth-century Russian 3-pound light howitzer consisting of two bores cast together as a unit. Invented by Danilov, one of the noted and gifted figures of the period.

BLINDAGE [*blindazh*] - Heavily protected defensive structure designed to protect personnel in the vicinity of a fire position from artillery and mortar fire. Blindages were first extensively employed during the defense of Sevastopol'.

HOMING DEVICE [*blok apparatury samonavedeniya*] - Special radioelectronic device installed in a guided missile to guide it to target in the terminal phase of the trajectory.

DRIVING EDGE OF RIFLING [*boyevaya gran' nareza*] - Right-hand edge of each groove in a gun barrel (as viewed from the breech end). Prevents projectile from travelling in a simple straight line and forces it to rotate around its axis. Opposing edge referred to as the 'non-driving' edge.

COMBAT VEHICLE [*boyevaya mashina*] - Tracked (or wheeled) armored vehicle mounted with fighting weapon. Term refers to tanks, self-propelled artillery, armored personnel carriers, armored cars etc. Term also used to designate a vehicle-mounted rocket launcher.

GUN AXLE [*boyevaya os'*] - I-beam or tube to which wheels are attached and which connects lower gun mount to running gear. The ends of the axle are round, cylindrical and threaded to accommodate a nut. Guns with torsion-type suspension are provided with splitaxles and equalizers in place of a one-piece axle.

FIRING SPRING [*boyevaya pruzhina*] - Spring mounted in breechblock of rifle, pistol or artillery piece. Drives firing pin assembly forward to strike and ignite primer (primer cup).

EFFECTIVE RATE OF FIRE [*boyevaya skorostrel'nost'*] - Maximum number of rounds which can be fired per unit time by a single weapon without damage to equipment and factoring in time required for reloading, relaying etc.

MISSILE WARHEAD [*boyevaya chast' rakety*] - Portion of missile containing charge (conventional or nuclear) and firing device. Most missiles currently in army inventories have conical or ogival warheads, or in some instances warheads combining both shapes. Operational-tactical and strategic missiles have warheads which in some instances do, and in others do not, separate from the main body of the missile when the latter reaches a certain velocity.

ORGANIZATIONAL RESERVE ARTILLERY [*boyevoye artilleriyskoye vooruzheniye zapasa*] - Artillery available for employment with special authorization only. Materiel maintained in fully assembled, operational, state together with required equipment, spare parts, tools and accessories (ZIP), thoroughly cleaned and lubricated. Heavy guns are stored in travelling position.

ORGANIZATIONAL TRAINING ARTILLERY [*boyevoye artilleriyskoye vooruzheniye tekushchego dovol'stviya*] - Artillery in current organizational inventory used for combat training purposes. Equipment is stored in assembled, operational, state together with all required tools, spare parts, instruments and accessories (ZIP) and continuously maintained in a state of full combat readiness.

AMMUNITION SUPPLY [*boyevoye pitaniye*] - System for supplying troops with weapons, ammunition, equipment etc. Ammunition supply responsibilities include the maintenance of weapon inventories and the storage, maintenance and repair of weapons. The central function of the ammunition supply system in modern-day combat operations consists in the timely supply of

operational combat forces with all necessary materiel, weapons, ammunition and components thereof.

ARTILLERY SERVICE ROUND [*boevoy artilleriyskiy vystrel*] - 1. Artillery round consisting of a projectile together with its charge. 2. The process by which a charge propels an artillery projectile from a gun.

BASIC LOAD (OF AMMUNITION), unit of fire [*boevoy komplekt*] - Quantity of ammunition established for each weapon (gun, mortar, machine gun, assault rifle etc.) or combat vehicle (tank, self-propelled gun, armored personnel carrier etc.).

The basic load is the supply accounting unit used to determine supply status and requirements of subunits* (units**) for ammunition deemed essential for accomplishment of a specific combat mission. The size of the basic load will vary with the type of weapon involved.

BATTERY COMBAT FORMATION [*boevoy poryadok batarei*] - Consists of guns deployed in firing positions and observation points.

PINTLE [*boevoy shtyr'*] - Solid component (pivot pin) beneath upper carriage of field gun serving as shaft around which upper carriage rotates horizontally. Absorbs and transfers recoil to lower carriage during firing.

ROCKET ARTILLERY COMBAT VEHICLES (GUARDS ROCKET LAUNCHERS) [*boevyye mashiny reaktivnoy artillerii (gvardeyskiye minometry)*] - Vehicle-mounted launchers designed to fire multiple rocket projectiles.

AMMUNITION [*boevyye pripasy (boevipripasy')*] - Articles of ordnance designed to be fired from any type of artillery weapon or small arm or dropped as a bomb with the objective of destroying enemy personnel, structures and fortifications. The term "ammunition" is understood to include artillery projectiles, all sizes and types of mortar shells, aviation bombs, naval torpedoes and depth charges, hand grenades, small arms cartridges etc. Modern-day combat operations entail the consumption of large volumes of different types of ammunition. The transportation of unit reserves and the need for resupply from the rear impose heavy transport capacity requirements.

MISSILE OPERATIONAL CHARACTERISTICS [*boevyye svoystva raketnogo oruzhiya*] - Set of data characterizing missiles as means of accomplishing the most critical missions in modern-day combat operations (warfare). Basic missile operational characteristics would include the following: long range, great destructive power of the nuclear warheads which can carry, high accuracy in destruction of targets (installations), versatility, possibility of mass-scale employment, maneuverability and relative invulnerability in flight.

* *podrazdeleniye*

** *chast'*

FIELD FIRING [*boyevyye strel'by*] - Artillery, tank or small arms fire using service or training ammunition. Field firing can be conducted either as a special exercise or within the context of exercises conducted jointly with other arms. In terms of objective, field firing activity can be categorized as follows: training firing, record firing, demonstration firing or test firing.

FIRING PIN [*boyek*] - Pin in breech mechanism of a gun. Ignites percussion cap or igniter tube.

BATTERY COMMANDER'S TELESCOPE [*bol'shaya stereotuba*] - Binocular optical instrument consisting of two prismatic periscopic telescopes which is capable of magnification of up to 10x. Base variable to 75 mm. The battery commander's telescope is designed to permit observation of the enemy, bursts of fire and the air to measure vertical and horizontal angles.

The battery commander's telescope is mounted on a tripod such that it can be rotated in the horizontal plane and slightly inclined in the vertical plane. Tubes can be extended horizontally or brought together vertically.

LARGE T [*bol'shoye smeshcheniye*] - Displacement when *T angle* is equal to or greater than 5-00. In the case of the large-angle T method, range deviations are observed as azimuth deviations, and azimuth deviations are observed as range deviations. This is the essential feature characterizing the large-angle T method.

BOMB [*bomba*] - Hollow cast-iron body formerly fired from mortars, howitzers and unicorns [*edinorogy*; cannons cast in a form resembling a unicorn's horn]. Bomb cavity was filled with powder. Igniter with quickmatch were then inserted into opening in casing. Igniter was sealed in resin-impregnated canvas material. Bombs weighing less than 1 pood were referred to as "shells" [*granaty*], those weighing more than 1 pood as "bombs" [*bomby*].

BOMBARD [*bombarda*] - Early artillery weapon used in the 14th-16th centuries to fire stone cannonballs. Bombards were used to invest cities and destroy the walls of fortresses.

BOMBARDIER [*bombardir*] - Rank-and-file naval artillery specialist (until 1846).

BOMBARD [*bombard*] - To fire on with artillery fire.

BOMBARDMENT [*bombardirovka*] - Employment of artillery fire at long range.

BOMB-THROWING CANNON [*bombicheskaya pushka*] - Largest-caliber (68 pounds) smooth-bore gun used by the Russian navy beginning in 1841. Bomb-throwing cannons fired powder-filled bombs ignited by time fuzes. In the first use of these weapons in combat, Russian artillerists completely destroyed a fleet of Turkish ships in the Battle of Sinop in 1853 with well-aimed fire from bomb-throwing cannons.

BRANDKUGEL, incendiary shot [*brandkugel*] - Incendiary projectile fired from Russian smooth-bore artillery of the 18th century. Consisted of a metal casing with incendiary compound.

BRIGADE (ARTILLERY) [*brigada (artilleriyskaya)*] - Large artillery formation [soyedineniye] consisting of several battalions (or, less frequently, regiments) and other units [*chast'*] and subunits [*podrazdeleniye*]. Artillery brigades were categorized as cannon, howitzer, mortar, antitank and combined organizations.

HIGH-EXPLOSIVE SHELL [*brizantnaya granata*] - Fragmentation artillery shell with time fuze.

HIGH-EXPLOSIVE EFFECT [*brizantnoye deystviye*] - Property of explosive substances enabling them upon detonation to shatter barriers with which they are placed in contact. Explosives such as TNT, ammonal, ammotol etc. achieve great high-explosive effect. These materials are used in artillery projectiles (mortar shells), rockets, bombs, sea mines, shore-controlled mines, torpedoes, land mines, grenades etc.

HIGH EXPLOSIVE [*brizantnyye (drobyashchiye) VV*] - Explosives which detonate very rapidly and produce a shattering effect. Explosives in this category would include trotyl, tol. tetryl, hexogen, PETN, melinite etc.

ARMOR-PIERCING TRACER [*broneboyno-trassiruyushchiy snaryad*] - Armor-piercing artillery projectile containing a base tracer, which as the projectile travels through the air leaves a distinctly visible trail (trace) in the form of a colored line: smokey during the day, fiery at night. The visibility of the trajectory facilitates and accelerates adjustment of fire. Armor-piercing tracers are employed primarily for fire directed against tanks and aircraft.

ARMOR-PIERCING CAP [*broneboynyy nakonechnik*] - Blunt steel (special steel, heat-treated) cap threaded onto nose of armor-piercing projectile. Armor-piercing caps were first used by Admiral S. O. Makarov in the 1890's, a time when armor-piercing projectiles were unable to penetrate the cemented armor of warships. Armor-piercing caps increase the armor-piercing ability of a projectile and enable it to destroy a solid layer of armor and at the same time protect the head of the projectile, which permits the body of the shell to continue its penetration of the armor intact and reduces ricochetting. A streamlined ballistic cap is threaded over the armor-piercing cap.

ARMOR-PIERCING SHELL [*broneboynyy snaryad*] - Projectile designed for fire directed against tanks, armored vehicles and other armored targets. Armor-piercing shells will characteristically have very strong bodies and relatively small internal cavities (shell wall thickness varying between 1/4 and 1/2 cal). Medium-caliber armor-piercing shells will be provided with a armor-piercing caps. Armor-piercing shells have bottom delay fuzes. All-metal armor-piercing shells (solid shot*) and *subcaliber* and *shaped-charge* projectiles are also employed to penetrate armor plating.

* *bolvanki*

ARMORED GUN CARRIAGE [*bronelafet*] - Armored artillery gun carriage. Gun carriage mounted with armor plate to protect personnel, mechanical components and equipment from damage.

ARMORED SELF-PROPELLED LAUNCHER [*bronirovannaya samokhodnaya puskovaya ustianovka*] - Highly mobile armored combat vehicle armed with a complement of missiles (rockets) designed to transport and launch the latter.

ARMOR [*bronya*] - Plate and sheet of varying length and thickness made of special steels and designed to protect personnel and equipment against bullets, shells and bombs. Armor can also provide antinuclear protection. The technique employed to roll armor steel was invented in Russia. According to foreign press reports, work is currently under way on the development of armor made of nylon and plastic sheet as well as of a variety of light alloys.

BREASTWORK [*brustwer*] - Vertical armor, concrete or earthen protective structure forward of guns, batteries or turrets.

ARTILLERY COMPASS, aiming circle [*bussol'*] - 1. Artillery instrument representing a combination of optical and goniometric instruments and declinometer (case with magnetic needle). Designed to orient guns and instruments in direction given by grid azimuth or base deflection*, determine grid azimuths or base angles in the field and to measure vertical and horizontal angles and distances with topographical referencing of positions and points. 2. (BUSSOL') - Angle in horizontal plane between direction of magnetic meridian and desired direction measured clockwise from direction to north.

* *bussol'*

V

VERNIER ENGINE [*vern'yeryy dvigatel'*] - Missile (rocket) control engine functioning as control surfaces in the control components of a missile control system. Generates constant thrust and can rotate relative to one or two axes by a substantial angle, which permits control of missile relative to all three axes (roll, pitch and yaw). Vernier engines can be rotated by electromechanical or electrohydraulic drive systems linked directly to control and orientation system sensor. Vernier engines can regulate the axis of thrust by rotating the entire propulsive jet, which generates a control force. Vernier engines are mounted toward the tail section of the missile. In some cases Vernier engines may be mounted in the nose, specifically at some point between the payload and the last stage of the missile.

CAVALRY SERGEANT MAJOR [*vakhmistr*] - 1. Senior bombardier in horse artillery of pre-revolutionary Russian army. 2. Deputy subunit* commander for supply and administration.

DELIVERY OF FIRE [*vedeniye ognya*] - Mode (order) of weapon fire (mortars, combat vehicles) employed in the execution of a fire mission. The following distinctions are made depending on the fire mission and the nature of the target: running fire, deliberate fire, volley fire and combination fire, i.e., running, deliberate and volley fire employed in a specific sequence.

DRIVING COMPONENTS OF ARTILLERY PROJECTILE [*vedushchiye chasti artilleriyskogo snaryada*] - Special device on external surface of a projectile consisting of a rotating band (or frequently two rotating bands) and centering shoulders.

ROTATING BAND (OF PROJECTILE) [*vedushchiy poyasok (snaryada)*] - Component of projectile consisting of a band (made of red or nickel copper) embedded in the annular neck of the

* *podrazdeleniye*

cylindrical portion of the body of the projectile. The rotating band (together with the rifling of the weapon) imparts rotational motion around the longitudinal axis to the projectile.

SHEAF [veyer] - 1. Sheaf of bursts, sheaf of fire [veyer razryvov] - Aggregate of bursts in a volley or a single battery (platoon) salvo. 2. Battery (platoon) sheaf [veyer batarei (vzvoda)] - Aggregate of bore axes of guns (mortars) laid in direction of fire. The sheaf may be parallel, concentrated or adjusted to cover the width of the target. The sheaf will be parallel when the axes of the bores of the guns as laid are parallel. The sheaf is concentrated when extensions of the bore axes of the guns as laid intersect at the range of the target. The sheaf will be referred to as a frontal sheaf when at the range of the target, the combined distances between extensions of the bore axes of neighboring guns (mortars) as laid equal the front of the target divided by the number of guns in the battery (platoon). The frontal sheaf may be either converging or diverging.

VECTORIAL ERROR [vektorial'naya oshibka] - Conventional term used to refer to a system of vector errors extending along a single straight line. Vectorial error is represented by a segment equal to the mean error or the mean square error of the system.

VALVE [ventil'] - Device for switching on and off or regulating flows of air or fluid in air or gas lines.

SPINDLE OIL [veretennoye maslo] - A mineral oil. Product of the refinement of petroleum. Anticorrosive, nonfreezing fluid. Three types depending on viscosity and purpose.

Spindle oil: physicochemical properties

Сорт веретенного масла (1)	Вязкость в сантиметрах (2)	Температура вспышки в $^{\circ}\text{C}$ (3)	Температура застывания в $^{\circ}\text{F}$ (4)
№ 2	11,8-14,0	165	-30
№ 3	19,0-23,0	170	-25
№ 3в	19,0-23,0	170	-15

KEY: 1 - grade; 2 - viscosity in cs; 3 - flashpoint, deg; 4 - solidification temperature, deg

Spindle oil No. 2 (sulfuric acid purification) used to fill cylinders in antirecoil devices, equilibrator pressure mechanisms, general-purpose speed regulators and other mechanisms. Spindle oil No. 2 is also used to lubricate components of the aiming mechanism when a gun is in daily use and to dilute heavy lubricants during the winter. Spindle oil No. 3 (sulfuric acid purification) is used to lubricate bearings and other mechanisms. Spindle oil No. 3v (leached) is used to harden metals during hot working.

VERNIER [vern'yer] - Auxiliary instrument permitting precise measurement of lengths (on a linear scale) or angles (on a circular scale) from the divisions of the main scale. Used in a range of measuring instruments. The "vernier" is occasionally referred to incorrectly as a "nonius." 2. Auxiliary device used for fine tuning (radio receivers etc.).

PROBABILITY THEORY [veroyatnostey teoriya] - Mathematical science concerned with study of laws governing random events. In probability theory, each individual observable fact is referred to as an "event." Error in measurement of target range, for example, would be referred to as an "event." An event is termed "certain" if it is impossible for it not to occur. That a projectile will fall once it has been fired, for example, is a "certain" event. An event is referred to as "random," on the other hand, if under a given set of conditions in a given experiment it may either occur or not occur. Deviations of a projectile from a target, for example, would be examples of "random" events. Probability theory studies only random events having a certain probability of occurring.

HIT PROBABILITY [veroyatnost' popadaniya] - Number characterizing the extent of the possibility that a projectile fired (or missile launched) will hit a target under a particular set of conditions. Hit probability is expressed as either a simple or decimal fraction (or in percent) and can vary from 0 to 1 (from 0 to 100%). If probability is zero, a hit is impossible. If probability is one (100%), a hit will be inevitable.

Knowledge of laws governing error in determining adjustments for fire (launch) directed against a particular target and of the fire (projectile, missile) dispersion law offers the possibility of establishing prior to firing (launch) the probability that a particular target will be hit under the given set of fire (launch) conditions. This requires knowledge of the portion of the *ellipse of dispersion* of the projectiles (missiles) covering the target under the particular set of conditions involved and then computation of the hit probability on the basis of the law of dispersion.

The magnitude of the hit probability will be a function of the location of the mean *impact point* relative to the center of the target, the dimensions of the target, the numerical characteristics of the dispersion law and the direction of fire (launch). To increase hit probability requires the coincidence of the mean projectile (missile) impact point with the center of the target, adjustments to minimize dispersion and maximum effort to destroy the target when it is most vulnerable.

PROBABILITY OF AN EVENT [veroyatnost' sobytiya] - Ratio of the number of cases conduced to the occurrence of a particular event under a given set of conditions to the number of all equally possible cases:

$$P=m/n,$$

where P is the probability of the event, m the number of cases conduced to the occurrence of the event and n the total number of all equally possible cases.

LAYING FOR ELEVATION, laying for range [*vertikal'naya navodka*] - Using aiming and elevating mechanisms to give barrel (launch rail) the angle of elevation required for a projectile to travel a desired distance and the point of impact or burst to occur at the desired range. Put differently, laying for elevation consists essentially in matching the angle of elevation (α) and the angle of site (ϵ) as established with the aiming mechanisms with the corresponding angles as measured in the field.

VERTICAL OFFSET [*vertikal'noye smeshcheniye*] (C_B)* - Distance (shortest) from gun to plane of observation of target site expressed in linear units.

VERTICAL DEFLECTION [*vertikal'noye uprezhdeniye*] ($\Delta\epsilon$) - Difference between lead point angle and fire point angle.

UPPER CARRIAGE [*verkhniy stanok*] - Solid, irregularly shaped steel component mounted with the tipping part of a gun, sighting mechanisms, equilibrator, shield and aiming mechanisms. The base of the upper carriage is fitted with a pivot pin which fits into an aperture in the lower carriage and functions as an axle for horizontal rotation of the upper carriage. The rotary mechanism can rotate the upper carriage through a certain angle in the horizontal plane. The pivot pin also transmits recoil accompanying firing from the upper carriage to the lower.

TIP OF PROJECTILE [*vershina snaryada*] - Front end of projectile. May be either sharp or blunt depending on the type of projectile and the purpose for which it is intended. If the projectile has a nose fuze, the shape of the tip will be determined by the exterior contour of the fuze.

SUMMIT OF PROJECTILE TRAJECTORY [*vershina trayektorii snaryada*] - Highest point along trajectory. The summit divides a trajectory into its ascending and descending branches. The ascending branch is the leg of a trajectory extending from the gun to the summit. The descending branch is the leg of a trajectory extending from the summit to the point of impact.

INITIAL WEIGHT [*ves nachal'nyy*] - Total weight of missile at launch, i.e., launch weight.

WEIGHT MARKINGS [*vesovyye znaki*] - Markings on the body of a projectile indicating deviations in the weight of the projectile from the standard (table) weight. Weight markings are applied to artillery projectiles in the form of pluses, minuses and combinations of upper-case letters. The mark (+) or (-), for example, would indicate that the weight of the particular projectile is greater or less than standard weight by 1/3 to 1%; the marking (++) or (--) indicates that the weight of the projectile in question deviates from standard by 1-1 2/3 %; (+++) or (---) by 1 2/3 - 2 1/3 %; (++++) or (----) indicates that the weight of the projectile deviates from standard by 2 1/3 - 3%. The marking "PZh" means that the weight of that particular projectile exceeds standard by more than 3%, "LG" that the weight of the projectile falls short of standard by more than 3%.

* transliterated

MISSILE PAYLOAD WEIGHT [*ves poleznoj nagruzki raketij*] - The payload weight for which a missile is designed. Payload may consist of an explosive (in military devices), an artificial Earth satellite, a container of scientific instruments, a vehicle carrying passengers etc.

FINAL WEIGHT [*ves konechnyy*] - Weight of missile at termination of acceleration along boost phase of trajectory after engine shutdown.

STRUCTURAL WEIGHT [*ves konstruktsii*] - Weight of missile minus fuel and payload.

RELATIVE WEIGHT [*ves otnositel'nyy*] - Weight ratio of the *initial weight* of a missile to the weight of the payload.

INTERCHANGEABILITY [*vzaimozamenyayemost'*] - 1. System of gun crew training whereby crew members learn to perform not only their own duties during firing, but those of other (two, three or even four) members of the crew as well. Loaders might learn the duties of assistant gunners etc., for example. 2. Design characteristic of components or assemblies of missile and artillery systems which permits the replacement of unsuitable components and assemblies without with the need for additional processing or modification of operating rules pertaining to the particular component or assembly.

VERTICAL LAUNCH [*vzlet vertikal'nyy*] - Motion whereby for a period of several seconds the center of mass of a missile translates vertically upward; the launch of a missile at an angle of elevation of 90°. Missiles launched vertically pass through the denser layers of the atmosphere by the shortest possible route and thereby suffer the least losses in velocity due to air resistance.

EXPLOSION, blast [*vzryv*] - Rapid (instantaneous) release of energy associated with the sudden change in the state of a substance, which will ordinarily be accompanied by the formation and propagation of a shock (blast) wave. Initial energy may be chemical, nuclear, electric, thermal and kinetic.

FUZE [*vzryvatel'*] - Mechanism imparting initial explosive impulse and transmitting it through detonation to the explosive charge in artillery, rocket and mortar projectiles.

The variety of types of ammunition together with the special features of the individual designs associated with both differences among targets and the conditions surrounding their destruction account for a corresponding variety in the types of fuze employed.

All fuzes, however, incorporate devices which ignite a percussion primer, which by transferring fire, ignites a detonating cap, which in turn detonates the detonator and the charge. Artillery projectiles have base fuzes, which are screwed into the base of the projectile, and nose fuzes, which are screwed into the nose portion of the projectile.

Base fuzes are used in large-caliber armor-piercing, concrete-piercing and high-explosive projectiles. Other projectiles employ the nose-type fuze. To intensify effect, some projectiles will be provided with both base and nose fuzes.

Mortar and rocket projectiles employ nose fuzes. Depending on the operating principle involved, artillery fuzes break down into percussion fuzes and time fuzes. Percussion fuzes may be either base fuzes or nose fuzes. They detonate an explosive charge when the projectile strikes an obstacle. Time fuzes are nose fuzes exclusively. They explode the projectile in flight before it strikes the target after the passage of the period of time for which the fuze is set. Modern percussion fuzes can be set for either instantaneous or delayed action and fragmentation or high-explosive effect, which in the case of artillery projectiles is achieved by removing the cap covering the striker. The pressure created upon contact with an obstacle will instantaneously depress the latter and thereby heat the detonating cap. With the cap left in place, the effect of impact with an obstacle on the striker is delayed, which enables the projectile to penetrate some distance into the obstacle. Some time fuzes have a percussion mechanism and what are referred to as "self-destruction devices," which explode a projectile in the event the time device fails. Depending on the mode by which the fire is transferred, the time fuzes can be categorized as either powder fuzes or mechanical fuzes. In the case of the powder fuzes, the fire from the percussion primer travels to the detonating fuze by way of powder tracks embedded in the time train rings, along the edges of which is a groove which permits setting for the desired burn time. The point at which the process is initiated in the mechanical fuzes is set by giving the appropriate number of turns to a spiral spring, the reverse travel of which is then controlled by a special device which stops this motion at the point established by the setting. This is the point at which the detonator explodes. All fuzes have safety devices which permit safe handling during the preparation of ammunition.

NONSAFETY FUZES [*vzryvateli nepredokhranitel'nogo tipa*] - Fuzes in which the igniter train remains closed; i.e., the fuzes in which the percussion primer is not isolated from the detonator, so that ignition of the percussion primer ignites the detonator as well and fires the projectile.

SAFETY FUZES [*vzryvateli predokhranitel'nogo tipa*] - Fuzes in which the percussion cap is isolated from the detonator. Actuation of the fuze closes the cap circuit with the detonator.

MULTISETTING FUZES [*vzryvateli s neskol'kimi ustanovkami*] - Variable-action fuzes with two or three settings: fragmentation (instantaneous), high-explosive (standard) and delayed action. Used to arm high-explosive, fragmentation and high-explosive fragmentation grenades, smoke projectiles etc.

ACOUSTIC PROXIMITY FUZE [*vzryvatel' akusticheskij nekontaktnyy*] - Mechanism igniting cap in mine or torpedo charge under the effect of a sound wave propagating through water. These fuzes will ordinarily be actuated by sound waves generated by propellers or other equipment in operation aboard ships.

INSTANTANEOUS FUZE [*vzryvatel' mgnovennoego deystviya*] - Fuze capable of exploding a projectile instantaneously, i.e., at the point at which projectile makes contact with an obstacle. Instantaneous fuzes are characteristically highly sensitive. They can be triggered by contact with the most insubstantial obstacle. Instantaneous fuzes are used to arm fragmentation grenades, mines and shaped-charge projectiles.

EXPLOSIVE CHARGE [*vzrynoy zaryad*] - Specific volume of explosive prepared for detonation. Used in blasting operations. Charge is exploded by fire (detonator ignited by safety fuze) or electrical device (electric blasting cap triggered by blasting machine or battery).

EXPLOSIVE [*vzryvchatoye veshchestvo*] - Chemical compound or mechanical mixture of substances capable of instantaneous breakdown (explosion) accompanied by the release of gas and substantial amounts of heat and the generation of high pressures along the shock wave front (trotyl, melinite, tetryl, hexogen, mercury fulminate, powder etc.). Nuclear explosives are materials capable of instantly releasing enormous energy in consequence of an explosive nuclear (thermonuclear) reaction.

TYPES OF NUCLEAR BURSTS [*vidy yadernykh vzryvov*] - Surface burst, airburst, high-altitude burst, water surface burst, underwater burst and underground burst. Choice of a particular type of nuclear burst will be determined by the specific nature of the destructive effect achieved, the characteristics of the target to be destroyed and the extent to which it must be destroyed and the permissible levels and required degree of accompanying radioactive contamination of the area.

SIGHT (to) [*vizirovat'*] - To aim sighting plane (optical axis of telescope or adjustable portion of goniometric instrument) at point of distant object selected by observer. Goniometric instruments without telescope use *diopters* for this purpose.

VISUAL OBSERVATION [*vizual'noye nablyudenije*] - A method of reconnaissance employing the naked eye or an optical instrument.

BRACKET [*vilka*] - 1. Difference between two angles of elevation (i.e., two elevation settings at one and the same range setting) which give different senses (one a long, the other a short). 2. Two volleys (rounds) fired at different elevation settings (taking account of the variation in range) which have given different senses (plus and minus).

AZIMUTH VARIATION RATE [*VIN* (*velichina izmeneniya napravleniya*)] - Magnitude of variation in direction to target per unit time.

SCREW GEAR [*vintovaya peredacha*] - Gear converting rotary motion to translational motion. Consists of a screw and housing. The screw has an external thread, the housing an internal thread. Rotation of the housing relative to the stationary screw imparts translational motion along the screw to the housing. Screw gears are extensively employed in sighting mechanisms and other fire-control instruments.

HELICAL GEARS [*vintovoye koleso*] - Gears, the teeth of which have helical surfaces. Employed in adjustment mechanisms used to lay for elevation.

RANGE VARIATION RATE [*VIR* (*velichina izmeneniya rasstoyaniya*)] - Magnitude of variation in range per minute. Rates of convergence (-)* and divergence (+)** are distinguished.

HYDROGEN BOMB [*vodorodnaya bomba*] - Bomb, operating principle of which is based upon exploitation of nuclear energy instantaneously released by thermonuclear reactions. Hydrogen bomb consists of a shell, a charge and an explosive device. The charge for a hydrogen bomb consists of a nuclear charge (uranium or plutonium) and a thermonuclear charge (deuterium or lithium). An atomic bomb functions as the detonator for a hydrogen bomb. The nuclear (atomic) charges are brought together by the detonation of a conventional explosive (trotyl). The establishment of contact between these components detonates an atomic bomb, which creates the conditions for a thermonuclear reaction, i.e., the explosion of a hydrogen bomb. In external appearance and shape, the hydrogen bomb is virtually indistinguishable from a large-caliber gravity bomb. The hydrogen bomb is the most terrifying ever known in history.

MILITARY TOPOGRAPHY [*voyennaya topografija*] - Military discipline developing and establishing methods and means of representing terrain features in support of troop combat operations. Military topography encompasses the study of terrain features from the tactical-operational point of view, the study of means of field orientation under different combat operational conditions, measurements performed by troops in the field to obtain data for solving small-arms, artillery, engineer and other special tasks and the study of problems of topographical support of combat operations.

AIR TRUCK [*vozdukhozapravshchik*] - See COMPRESSED AIR TRUCK [*zapravshchik s zhatym vozdukhom*].

(AIR-BREATHING) JET ENGINE [*vozdushno-reaktivnyy dvigatel'* (*VRD*)] - Jet engine which uses atmospheric oxygen to burn its fuel. Jet engines can be categorized as ram-jet (PVRD [*pryamotochnyye*]), pulse-jet (PuVRD [*pul'siruyushchiye*]) and turbo-jet (TRD [*turboreaktivnyye*]) engines. See JET ENGINE [*reaktivnyye dvigateli*].

ROCKET PROJECTILE [*vozdushno-reaktivnyy snaryad*] - Projectile powered by a rocket engine.

AERODYNAMIC CONTROL SURFACES [*vozdushnyye ruli*] - Small controllable airfoils mounted a certain distance from the center of gravity of a missile designed to help ensure stability and controllability. Aerodynamic control surfaces can be mounted both forward and aft of the center of gravity. They can function in the comparatively dense layers of the atmosphere and generate the moment which rotates the missile about its center of gravity.

* VIR sblizheniye

** VIR udaleniye

ATMOSPHERIC DISTURBANCES [*vozmushcheniya atmosferye*] - Local increases in air density and pressure (temperature) propagating in the form of waves and generated, for example, by the passage of a body or an explosion. More serious atmospheric disturbances cause shock waves (pressure jumps). Shock waves can be both normal and oblique.

ORGANIZATIONAL ARTILLERY [*voyskovaya artilleriya*] - Artillery organic to the composition of a military unit. Artillery can be organic at army, corps, divisional, regimental and battalion levels.

SHOCK DRAG [*volnovoye soprotivleniye*] - Secondary pressure drag generated at supersonic velocities in consequence of the increase in the difference between the pressure forward of the front portion of the body (of the missile) and the pressure behind it. Wave drag acts in the direction opposite that in which the missile is travelling. At supersonic velocities, the coefficient of shock drag will be a function of Mach number, the thickness and shape of the wing profile etc. To reduce shock drag on a missile in flight, the nose is shaped such that the developing shock waves are oblique and the angle of inclination with respect to the longitudinal axis of the missile approaches the Mach angle.

CRATER [*voronka*] - Depression formed in the earth or other material at the point at which an artillery projectile (mortar shell, gravity bomb, explosive charge) explodes. Three spheres can be distinguished in the medium subject to the action of the gas associated with the explosive charge of an artillery projectile (mortar shell, bomb): compression, destruction and percussion. The volume of a crater will be a function of the weight and type of the explosive charge employed, the physical properties of the soil and the depth to which the projectile penetrates before it explodes.

EDDY SUPPRESSOR [*voronkogasitel'*] - Device placed ahead of the mouth of a pipeline to prevent eddying and the formation of gas in the fuel flow.

IGNITION (OF POWDER, CHARGE) [*vosplameneniye porokha (zaryada)*] - Propagation of flame over the surface of the grains of a powder charge. The rate at which the flame propagates over the surface of a grain of powder is referred to as the "ignition rate."

IGNITER [*vosplamenitel'*] - Small charge of black powder placed at the bottom of a powder bag (shell casing) to ignite a charge of smokeless powder. Igniters for small-caliber weapons consist of small silk bags filled with smokeless rifle powder. Igniters for the charges used in large artillery pieces are made of prismatic black powder (1, 3, 7 prisms). With combustion in the barrel, the igniter develops the temperature and initial pressure (30-50 atm) required for the flame (hot gas) to propagate over the entire surface of the charge, which in turn ensures complete and efficient combustion of the smokeless powder.

ASCENDING LEG (OF TRAJECTORY) [*voskhodyashchaya vety' trayektorii*] - Leg of trajectory extending from the origin to the summit.

ROTATING PORTION (OF GUN) [*vrashchayushchaya chast' orudiya*] - Barrel and attached gun components which rotate as a gun is layed for direction, provided that the rest of the piece remains (can remain) stationary on its supporting base.

TEMPORARY FIRING POSITIONS [*vremennyye ognevyye pozitsii*] - Firing positions temporarily occupied by fire weapons for the purpose of executing specific fire missions. By firing from temporary firing positions, these weapons enable the precise location of the primary firing positions to remain undetected. As far as the engineer work is concerned, temporary firing positions will in most instances be equipped in precisely the same way as the primary firing positions.

FIRE COMMAND-TO-EXECUTION DELAY (τ_d) [*vremya zapazdyvaniya vystrela* (τ_d)] - Interval of time between command (signal) of "Fire" and the point at which round is fired.

FUZE-SETTING DELAY (τ_N) [*vremya zapazdyvaniya ustanovki trubki* (τ_N)] - Interval of time between the setting of the fuze and the point at which the round is actually fired.

FLIGHT TIME [*vremya poleta*] (t) - Interval between the exit of a projectile and the point in time at which it reaches a particular point along the trajectory.

SPLASH [*vsplesk*] - Column of water raised by a projectile striking a water surface. The height of a splash will be a function of the caliber of the projectile and the shape of the nose portion, the angle of fall, terminal velocity and the wind and the waves. For example, a 305-mm projectile striking a water surface will produce a splash 50-60 m high and up to 20 m wide at the base. Splash column duration time will depend on the caliber of the projectile and the wind: in the case of the larger projectiles this will range between 6 and 15 s, between 2 and 5 s for the medium projectiles.

AUXILIARY EQUIPMENT [*vspomogatel'noye oborudovaniye*] - Complement of equipment and apparatus required for the fuelling, prelaunch inspection and final check of a missile. The full complement of auxiliary equipment would include the tanks for storing the components of the fuel, fuelling equipment (devices), tools and test equipment required to conduct pre-launch inspection and final check of missile, transport vehicles, launchers etc.

AUXILIARY POWER SOURCES (OF GUIDED MISSILE) [*vspomogatel'nyye istochniki energii upravlyayemoy raketoy*] - Sources (electrochemical, mechanical or electromechanical) powering systems and instruments aboard a missile in flight.

AUXILIARY ROCKET ENGINE [*vspomogatel'nyy raketnyy dvigatel'*] - Rocket engine on jet-powered vehicle serving an auxiliary purpose. The functions of this type of engine supplement that of the main (sustainer) engine. The category of "auxiliary rocket engine" would include booster engines, auxiliary launch engines, vernier rockets, retrorockets, rescue rockets, gas generators etc. In terms of design and function, this category of engine exhibits the greatest variety.

FLASH [*vsplyshka*] - Instantaneous ignition of powder (priming powder) or other fuel.

SECOND PHASE OF FIRING PROCESS [*vtoroy period vystrela*] - Phase in which projectile is accelerated by the expansion of a constant amount of highly compressed and heated gas. No gas is admitted into the system. The exit of the projectile from the muzzle terminates the second phase of the firing process.

ENTRANCE PUPIL (OF OPTICAL INSTRUMENT) [*vkhodnoy zrachok opticheskogo prihvara*] - Lens diameter. Two values are usually given on optical instruments: magnification and diameter of lens in millimeters. In the case of a pair of binoculars, for example, 8x40 would indicate that (1) this particular pair of binoculars has a magnification of 8 power and (2) that the lens is 40 mm in diameter.

INITIAL DATA [*vkhodnyye dannyye*] - Data characterizing the location or motion of a target and used in computations and measurements in the preparation of data on the basis of which to open fire (field artillery) or, in the case of antiaircraft artillery, to establish initial settings.

EXTRACTOR [*vybrasyvatel' (ekstraktor)*] - Breechblock device designed to remove spent cartridge cases from the chamber-end of the barrel when the breechblock opens after a round is fired. The extractor consists of one or two claws mounted in special recesses in the breech portion of the breech ring. The claw can rotate through a certain angle and has two arms: one long, one short. The extractor operates as a first-order lever. The opening of the breech-block applies a force to the short arm of the claw (extractor), which, in rotating, then enables the hooked long arm to extract the spent shell casing from the barrel. The upper projections (hooks) on the extractor then engage the wedge cam lobes and hold it open until another round is rammed into the gun.

ASSEMBLY POSITION [*vyzhidal'naya pozitsiya*] - Engineer-prepared field position designed for concealed disposition of equipment and personnel of subunits of missile units and rocket artillery until the time designated for advancement to the start or firing line.

PUNCH, knock-out [*vykolutka*] - Tapered steel or bronze rod used as a tool to remove or replace pins and bolts during assembly and tear-down of artillery equipment.

HEIGHT TO BORE OF GUN (H) [*vysota linii ognya (H)*] - Distance between axis of bore and plane base plate of artillery piece in firing position as measured from base plate to parallel bore.

HEIGHT OF BURST (h) [*vysota razryva (h)*] - Shortest distance between plane of target site to air burst.

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